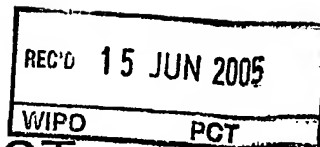


# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY



To:

see form PCT/ISA/220

AP

PCT

## WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing  
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference  
see form PCT/ISA/220

**FOR FURTHER ACTION**  
See paragraph 2 below

International application No.  
PCT/US2004/034327

International filing date (day/month/year)  
19.10.2004

Priority date (day/month/year)  
21.10.2003

International Patent Classification (IPC) or both national classification and IPC  
C08G61/10, C08F38/00, C07C49/753; C07C49/683, C08J9/26, C08L65/00

Applicant  
DOW GLOBAL TECHNOLOGIES INC.

**1. This opinion contains indications relating to the following items:**

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

**2. FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

**3. For further details, see notes to Form PCT/ISA/220.**

Name and mailing address of the ISA:



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**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/US2004/034327

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**Box No. I Basis of the opinion**

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1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
  - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material:
    - ☐ a sequence listing
    - ☐ table(s) related to the sequence listing
  - b. format of material:
    - ☐ in written format
    - ☐ in computer readable form
  - c. time of filing/furnishing:
    - ☐ contained in the international application as filed.
    - ☐ filed together with the international application in computer readable form.
    - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/US2004/034327

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**Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

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The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application,
- ☒ claims Nos. 1(part)-3(part),5(part)-7(part)

because:

- ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):
- ☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
- ☒ the claims, or said claims Nos. 1(part)-3(part),5(part)-7(part) are so inadequately supported by the description that no meaningful opinion could be formed.
- ☐ no international search report has been established for the whole application or for said claims Nos.
- ☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:
  - the written form ☐ has not been furnished
  - ☐ does not comply with the standard
  - the computer readable form ☐ has not been furnished
  - ☐ does not comply with the standard
- ☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in Annex C-*bis* of the Administrative Instructions.
- ☐ See separate sheet for further details

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/US2004/034327

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**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or  
Industrial applicability; citations and explanations supporting such statement**

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**1. Statement**

Novelty (N)	Yes: Claims	1(part)-3(part),4,5(part)-7(part)
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	1(part)-3(part),4,5(part)-7(part)
Industrial applicability (IA)	Yes: Claims	1(part)-3(part),4,5(part)-7(part)
	No: Claims	

**2. Citations and explanations**

**see separate sheet**

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING  
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/US2004/034327

- D1** US 5 965 679  
**D2** WO 03/068825  
**D3** US 6 172 128 cited in the present application

**Item III**

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The present claim 1 relates to a compound defined by reference to a desirable property namely A and C' functional groups are able to react with B-functional group to produce a cross-linked polyphenylene polymer. This claim covers all compounds having this characteristic property, whereas the application provides support within the meaning of article 6 PCT or disclosure within the meaning of article 5 PCT for only a very limited number of such compounds, exactly a single one (cf. example 1).
2. Claim 1 does not meet the requirements of Art.6 PCT in that the matter for which protection is sought is not clearly defined. The claim attempts to define the subject-matter in terms of the result to be achieved which merely amounts to a statement of the underlying problem, production of a cross-linked polymer.
3. As regard to the subject-matter of claims 2 and 3, it relates to an extremely large number of possible monomers. Support within the meaning of article 6 PCT and disclosure within the meaning of article 5 PCT is to be found, however, for only a very small proportion of the compounds claimed, only one monomer in example 1.

**Item V**

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

**1. Novelty (Art.33(2) PCT)**

**D1** discloses monomers containing one cyclopentadienone group together with two aromatic acetylene groups and polymers made from such monomers (table I, compounds A, B, D-F, col.37-40). The manufacture of crosslinked materials is obtained therein by reacting

polyfunctional compounds having two or more cyclopentadienone groups with polyfunctional compounds having two or more aromatic acetylene groups, at least some of the polyfunctional compounds having three or more reactive groups.

In **D2**, monomers containing at least two cyclopentadienone groups together with at least two phenylacetylene groups are listed under Formulae II to XXVII (pages 7-16; examples 1-5, 18, 22, 24, 38) obtained by cycloaddition between A- and B-functional groups. These are reacted with a cross-linked polystyrene poragen to produce a porous matrix (examples 32-37).

**D3** describes crosslinked polymers by reacting polymers containing cyclopentadienone groups with other polymers containing phenylacetylene groups (figures 3, 4, 11 and 13).

Crosslinked or crosslinkable polyarylenes that are stable at high temperatures and have good electrical insulative properties have been taught for use in the manufacture of microelectronic devices, for instance in **D1-D3**.

## **2. Inventive step** (Art.33(3) PCT)

The closest related monomers are known from **D2** and differ from the ones of claim 4 in that they do not contain open acetylene moieties:  $\text{HC}\equiv\text{C}-$ . This document teaches that the selection of poragens combined with monomeric precursors of organic polymers, such as poly(arylene) or poly(arylenether) enables to produce matrix materials with very small pore sizes. The technical problem posed in the present demand is to look for other suitable monomeric precursors in this respect. The proposed solution are the monomers listed in claim 1, i.e. the incorporation of C'-groups in the monomers known from **D1** or **D2**. No inventive step can be recognized for the subject-matters of claims 1 to 7 for the following reasons:

- 2.1 In the present application on page 24, lines 20-24 it is written that this incorporation provides an improvement over **D2** in that the monomers containing A, B and C' functional groups possess an enhanced rate of crosslinking at lower temperatures (pages 24-25). Only one single monomer  $\text{A}_2\text{B}_2\text{C}_2'$  has been prepared, b-staged and cured (pages 28-32). DSC-analysis was performed. No experimental data were provided about the flex storage modulus versus temperature in order to assess that the incorporation of the C'-functional group in the monomer renders the polymeric

composition suitable for the production of porous matrix. Accordingly there is no proof that the proposed monomer solves the technical problem posed.

- 2.1 As discussed above, it has not been proven that the only single prepared monomer according to claim 1 does actually show the alleged properties (cf. example 1). Further definitions as described in claims 1 to 3 cannot be considered as a reasonable generalisation of this single example. The core of the application resides into the preparation of monomer and/or oligomer via the cycloaddition between a tetracyclone, acetylene and phenylacetylene (cf. claim 4). In the present case claims 1-4 so lack support, and the application so lacks disclosure that an inventive step over the whole of the claimed scope is impossible without providing further experimental evidence for the alleged effects.